

THE MUSSELS OF SOUTHWEST MISSISSIPPI STREAMS

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ABSTRACT

Bayou Pierre, Cole's Creek, Homochitto River and Buffalo River are major tributaries of the Mississippi River in southwest Mississippi. With the exception of a small portion of Bayou Pierre, all are marked by a paucity of mussels. Three years of collecting have revealed 13 species from Bayou Pierre, two from Cole's Creek, seven from Homochitto River, and none from Buffalo River. Mussels are present in these streams only in localized populations. The predominately sandy substrata appears to limit density and diversity of unionid molluscs in these rivers.

There is little published information available on the mussel fauna of southwest Mississippi streams (Bayou Pierre, Cole's Creek, Homochitto River, Buffalo River). In his monograph on Mississippi mussels, Grantham (1969) recorded a single species from the Homochitto River (*Lampsilis clai-bornensis* Lea, 1838) and none from the other streams. Hartfield and Cooper (1983) listed five species from Bayou Pierre (*Potamilus purpuratus* (Lamarck, 1819), *Lampsilis ovata ventricosa* (Barnes, 1823), *Lampsilis straminea clai-bornensis* (Lea, 1838), *Leptodea fragilis* (Rafinesque, 1820), *Tritogonia verrucosa* (Rafinesque, 1820), six from the Homochitto (*Toxolasma texasensis* (Lea, 1857), *Fusconia flava* (Rafinesque, 1820), *Unio merus declivus* (Say, 1831), *Anodonta imbecillis* Say, 1829, *Lampsilis radiata luteola* (Lamarck, 1819), *Villosa lienosa* (Conrad, 1834), and commented on the rarity of mussels in this general area.

This paper is the result of a three year survey of freshwater mussels of southwest Mississippi streams. The purpose of this study was to determine the naiad species composition of these drainages as part of a statewide survey of the mussel fauna of Mississippi.

METHODS

From the spring of 1980 through the fall of 1983, a total of 148 collecting trips were made to 60 sites on southwest Mississippi streams (Fig. 1). Mussels were searched for by hand grabbing, snorkel and dipnets. Stream beds were walked and searched for dead or live specimens. Voucher specimens were deposited in the Ohio State Museum of Zoology and bivalve collection of the Mississippi Museum of Natural Science.

STUDY AREA

Southwest Mississippi streams flow across parts of three distinct physiographic regions. The western part of the study area lies in a narrow band of the Mississippi Alluvial Plain, known locally as the Delta. East of the Delta are the Loess Hills, a 30-60 km wide area of thick deposits of fine soil. Streams cut through the hills to underlying Miocene deposits of sand, gravel, and clay. Stream headwaters originate in the Pine Hills physiographic region which were formerly comprised of the red sand and gravel of the Citronelle formation. Citronelle now remains only on the highest ridges and hills and the streams flow through the underlying Miocene formations (Cross *et al.*, 1974).

Bayou Pierre (Fig. 1) drains 2770 sq. km with a mean annual flow of 33.6 cubic meters/second (cms) (Lower Mississippi Region Coord. Comm., 1974). Throughout most of its drainage the main channel consists of a shallow low-flow stream meandering within a wide sand and gravel filled eroded channel. There is no closed canopy over the stream and in many places pastures and cultivated fields extend to the banks. The river channel above Smyrna is narrow and well-defined with low banks and a few small sand and gravel bars. The channel and bank are not eroded, and throughout most of the upper reach there is a well-developed forest canopy. The upper reach also has many logjams and snags that slow flood waters and stabilize the sand and gravel substrata.

Cole's Creek drains 1088 sq. km and has a mean annual flow of 13.3 cms (Lower Mississippi Region Coord. Comm., 1974). The stream bed is wide and filled with sand and gravel throughout the drainage. At low flow Cole's

Creek is very shallow although potholes do occur around sandstone outcroppings, logs and bridges. Potholes are repeatedly filled and scoured by seasonal floods. There is little sign of channel degradation although there is some evidence of lateral erosion from the middle stretches of Cole's Creek to its mouth. Bridges on the stream are 40-50 years old and show little evidence of having supporting understructure degraded by stream movement.

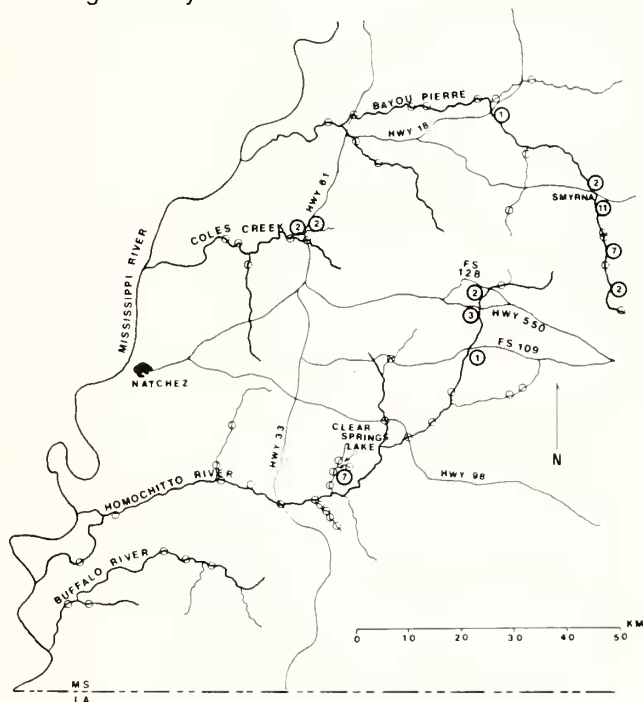


Fig. 1. Streams of southwest Mississippi. Open circles represent localities searched. Numbers represent the number of species collected at specific localities.

The Homochitto River is the largest stream in the study area and drains 3108 sq. km with a mean annual flow of 42 cms (Lower Miss. Region Coor. Comm., 1974). Headwaters and tributaries are generally canopy-covered with seasonal potholes and eddies around sandstone outcrops, logs and debris. The main channel is known for its quicksand and ever-changing channel, although most of this reputation has been earned in the last 40 years. In 1938-1940, channel modification by the U.S. Army Corps of Engineers in the lower reach of the river reduced the length by 24 km. Wilson (1979) found that the resulting increase in the slope of the water surface, resistance reduction and corresponding increase in stream velocity has caused vertical degradation of up to 5.7 meters and lateral channel movement of up to one kilometer. Tributaries in the lower reach have been similarly affected.

The Buffalo River is the smallest and the southernmost stream in the area. It drains 1087 sq. km and has a mean annual flow of 15 cms (Lower Miss. Region Coor. Comm., 1974). The middle reach and headwaters are shallow and lie within a wide sand-filled flood channel. Potholes and eddies are occasionally found along outside bends and around logs and other obstructions. In the Delta the lower reach is deep and bayou-like with little or no perceptible current.

RESULTS AND DISCUSSION

Sixteen species of unionid mussels and the Asiatic clam were collected from the study area (Table 1). All species are common Mississippi Region fauna. Live mussels were found at only 11 of the 60 sites surveyed (Fig. 1). Most of the other 49 sites provided little or no evidence of mussel fauna.

Only a few weathered shells were collected in the lower half of Bayou Pierre. Live individuals were commonly taken in the upper one third of the drainage. The largest community encountered was along a 200 m length of stream near the headwaters where eleven species were collected around sunken logs, logjams and protected eddies. At other upstream locations mussels were also found in greatest abundance around stabilized substrata protected by submerged timber. *Fusconaia flava* and *Quadrula pustulosa* (Lea, 1831) were the only species commonly collected in unprotected sand. The record of *Lampsilis straminea claibornensis* from Bayou Pierre by Hartfield and Cooper (1983) was a misidentification of *Lampsilis radiata luteola*.

Habitats in Bayou Pierre with relatively high concentrations of bivalves consisted of stable and protected sand or silty substratum in a narrow, low-flow channel defined by vegetated banks and with few sand or gravel bars. Unfortunately this type of habitat appears to be gradually disappearing from the system. Rich (1968) noted that agricultural activities and canopy removal were responsible for the gradual filling of the main channel of Bayou Pierre and that the average depth of potholes had gradually diminished from two to one meter. In his 1976 survey of the Bayou Darter, Teels stated that the eroded and non-eroded portions of Bayou Pierre met approximately 3 km downstream from the Smyrna crossing. In 1983 erosion extended to the Smyrna bridge, and it was observed during a recent visit in 1985 that the erosion extended over 1.5 km upstream from the bridge and had claimed the most diverse mussel community encountered during our survey.

No mussels were found in the main channel of Cole's Creek, but two species, *Toxolasma texasensis* and *Unio merus tetralasmus* (Say, 1831) were collected in Shanktown Creek, a small tributary. Pools between logjams and sandstone outcrops in this narrow stream appear to maintain the mussels during low flow when there is little current.

The Homochitto is the largest stream in the study area, but only seven species have been collected from it. During 1980-1981 we were unable to find either live mussels or shells in the main channel of the Homochitto or its tributaries. However in 1982 a bivalve community consisting of *Lampsilis radiata luteola*, *Villosa lienosa*, *Toxolasma texasensis*, *Anodonta imbecillis*, *Fusconaia flava*, *Elliptio crassidens* (Lamarck, 1819) and *Unio merus declivus* was found in a 200 m reach between a U.S. Forest Service dam on Clear Springs Creek and Richardson Creek.

Clear Springs Dam is the oldest tributary dam in the Homochitto drainage and was dedicated the year after channelization of the lower Homochitto was completed. Substratum below the dam is sand and gravel stabilized by

Table 1. Bivalves collected in southwest Mississippi streams 1980-1983. + present, — absent.

SPECIES	BAYOU PIERRE	COLE'S CREEK	HOMOCHITTO	BUFFALO
UNIONIDAE				
<i>Anodonta imbecillus</i> Say, 1829	—	—	+	—
<i>Strophitus subvexus</i> (Conrad, 1934)	+	—	—	—
<i>Tritogonia verrucosa</i> (Rafinesque, 1820)	+	—	—	—
<i>Quadrula pustulosa</i> (Lea, 1831)	+	—	—	—
<i>Fusconia flava</i> (Rafinesque, 1820)	+	—	+	—
<i>Elliptio crassidens</i> (Lamarck, 1819)	—	—	+	—
<i>Unio merus declivus</i> (Say, 1831)	—	—	+	—
<i>Unio merus tetralasmus</i> (Say, 1831)	—	+	—	—
<i>Obovaria subrotunda</i> Rafinesque, 1820)	+	—	—	—
<i>Leptodea fragilis</i> (Rafinesque, 1820)	+	—	—	—
<i>Potamilus purpurata</i> (Lamarck, 1819)	+	—	—	—
<i>Toxolasma texasensis</i> (Lea, 1857)	+	+	+	—
<i>Villosa lienosa</i> (Conrad, 1834)	+	—	+	—
<i>Lampsilis teres anodontoidea</i> (Lea, 1831)	+	—	—	—
<i>Lampsilis ovata ventricosa</i> (Barnes, 1823)	+	—	—	—
<i>Lampsilis radiata luteola</i> (Lamarck, 1819)	+	—	+	—
CORBICULIDAE				
<i>Corbicula fluminea</i> Müller, 1774)	+	—	—	—

caddisfly nets with loose sand and detritus in pools and eddies. Above the dam the creek is shallow and the substratum is almost entirely fine sand. No mussels have been found either above the dam or in the loose sand and gravel of Richardson Creek.

Only three small communities of mussels have been found in the main channel of the Homochitto. One of these consisted of only two specimens of *Villosa lienosa* that were collected in loose sand at Forest Service (FS) Road 109. The largest collection of mussels in the main channel was at State Highway 550. *Villosa lienosa* (2), *Toxolasma texasensis* (2), and *Lampsilis radiata luteola* (1) were collected within a two square meter area on a small bed of packed sand covered by a fine layer of silt. Two specimens of *V. lienosa* and three of *T. texasensis* were collected at the FS Road 128 site after an intensive search of .4 km of stream. The record of *Lampsilis claibornensis* from the Homochitto by Grantham (1969) was almost certainly a misidentification of *Lampsilis radiata luteola*, as many specimens in this system lose their distinctive rays with age.

USGS observations from the early part of this century indicate that the main channel was deeper, narrower and more stable than its present day condition (Wilson, 1979). Although no historic records of freshwater mussels exist from this drainage, a more widespread bivalve fauna may have occurred prior to channel modifications by the Corps of Engineers.

The Buffalo River is a shallow clear-water stream in its upper and middle reach but it becomes sluggish and deep with little current when it enters the Mississippi Delta. No live mussels or shells have been found in any section of the river.

ACKNOWLEDGMENTS

Dr. David Stansbery of the Ohio State Museum of Zoology con-

firmed the identification of selected specimens, and Dr. Robert Jones of the Mississippi Museum of Natural Science provided helpful comments and suggestions.

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